

It is claimed:

1. A computer-implemented method for offering items over channels to individuals, said method comprising the steps of:

- 5                   receiving offer acceptance-related data for the individuals;  
                  creating aggregations of individuals based upon degree of similarity of offer acceptance-related data among the individuals;  
                  performing a mathematical optimization upon an objective function that uses proportion of aggregation individuals in an aggregation to offer an item over a channel for  
10   substantially optimizing a preselected marketing-based criteria; and  
                  identifying through the mathematical optimization the proportion of aggregation individuals within an aggregation to offer an item over a channel that substantially optimizes the preselected marketing-based criteria;  
                  wherein the identified proportion of aggregation individuals is used to  
15   determine which items are to be offered to which individuals over which channels.

2. The method of claim 1 wherein individuals comprise businesses.

3. The method of claim 1 wherein individuals comprise individual people.

20

4. The method of claim 1 wherein the individuals comprise existing customers.

5. The method of claim 1 wherein the individuals comprise potential customers.
6. The method of claim 1 wherein items comprise products.
- 5 7. The method of claim 1 wherein items comprise services.
8. The method of claim 1 wherein a data mining system generates the offer acceptance-related data.
- 10 9. The method of claim 1 wherein the individuals are customers, wherein the offer acceptance-related data is provided as customer raw data, wherein the customer raw data is generated by estimating expected returns from customers for up-sell or cross-sell opportunities across multiple items offered over multiple channels.
- 15 10. The method of claim 9 wherein the customer raw data for each customer may include the likelihood that a given item offered over a given channel will be accepted, the expected return from a given item given the offer is accepted, the cost of making the offer, and the particular segment to which the customer belongs.
- 20 11. The method of claim 1 wherein the aggregations are created based upon an aggregation factor, wherein the aggregation factor comprises cost of offering an individual a particular item and expected profit of offering the individual the particular item.

12. The method of claim 1 wherein the mathematical optimization uses a linear program to identify proportions within each aggregation for each offer that maximizes expected profit subject to at least one preselected model constraint.

5

13. The method of claim 12 wherein the model constraints comprise an aggregation constraint.

14. The method of claim 13 wherein the model constraints comprise a segment constraint.

10

15. The method of claim 14 wherein the model constraints comprise an item constraint.

16. The method of claim 15 wherein the model constraints comprise a budget constraint.

15 17. The method of claim 1 wherein the mathematical optimization comprises a non-linear optimization technique.

18. The method of claim 1 wherein the objective function substantially maximizes the return on marketing investment (ROMI).

20

19. The method of claim 1 wherein an aggregation comprises a centroid that is used as representative of the data for all the individuals within the aggregation when performing the mathematical optimization.
- 5 20. The method of claim 1 wherein the mathematical optimization uses a linear program.
21. The method of claim 1 wherein the identified proportion is represented as a continuous variable that identifies number of members of an aggregation that should be given an offer.
- 10 22. The method of claim 1 wherein the individuals are customers, wherein the offer acceptance-related data is provided as customer raw data, wherein the aggregations are disaggregated using the identified proportion of aggregation individuals in order to obtain approximate optimal item and channel assignments, wherein the obtained item and channel assignments are approximately optimal with respect to the raw customer data.
- 15 23. The method of claim 1 wherein a greedy algorithm uses the identified proportion of aggregation individuals in a cluster to determine which items are to be offered to which individuals over which channels.
- 20 24. The method of claim 1 wherein a random assignment algorithm uses the identified proportion of aggregation individuals to determine which items are to be offered to which individuals over which channels.

25. The method of claim 1 wherein the determination of which items to offer to which individuals over which channels enhances long term value of the customer.

5 26. The method of claim 1 wherein the determination of which items to offer to which individuals over which channels is directed to offering of such items to customers over multiple events.

27. The method of claim 1 wherein the determination of which items to offer to which  
10 individuals over which channels is used to understand overall potential for cross-selling.

28. The method of claim 1 wherein the determination of which items to offer to which individuals over which channels is used to understand potential for new product development.

15

29. The method of claim 1 wherein the mathematical optimization is used in campaign budget allocation analysis.

30. The method of claim 1 wherein the mathematical optimization is used in channel  
20 capacity planning analysis.

31. The method of claim 1 wherein the aggregations of individuals are clusters of individuals, wherein the clusters are created based upon degree of similarity of offer acceptance-related data among the individuals.

5 32. Computer software stored on a computer readable media, the computer software comprising program code for carrying out a method according to claim 1.

33. A computer-implemented apparatus for offering items over channels to individuals based upon offer acceptance-related data that is associated with the individuals, said apparatus comprising:

10 an aggregation data structure for storing aggregations of individuals that have been created based upon degree of similarity of offer acceptance-related data among the individuals;

a mathematical optimization program having a data connection to the aggregation data structure, wherein the mathematical optimization program performs a  
15 mathematical optimization upon an objective function that uses proportion of aggregation individuals in an aggregation to offer an item over a channel which substantially optimizes a preselected marketing-based criteria, said mathematical optimization program substantially optimizing the preselected marketing-based criteria with respect to preselected business constraints; and

20 a disaggregation program that uses the proportion of aggregation individuals determined by the mathematical optimization program to determine which items are to be offered to which individuals over which channels.

34. A computer-implemented apparatus for offering items over channels to individuals, comprising:

- means for receiving offer acceptance-related data for the individuals;
- means for creating clusters of individuals based upon degree of similarity of offer acceptance-related data among the individuals;
- means for performing a mathematical optimization upon an objective function that uses proportion of cluster individuals in a cluster to offer an item over a channel for substantially optimizing a preselected marketing-based criteria; and
- means for identifying through the mathematical optimization the proportion of cluster individuals within a cluster to offer an item over a channel that substantially optimizes the preselected marketing-based criteria;
- wherein the identified proportion of cluster individuals is used to determine which items are to be offered to which individuals over which channels.